The Relationship Between Endowment and Ownership Effects in Memory Across Cultures

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Abstract

An object one owns is typically more highly valued than an equivalent object owned by another person. This endowment effect has been attributed to the aversion of loss of one's possessions (through selling), or the added value of an item due to self-association (through owning). To date, investigation of these mechanisms has been hampered by the between-subjects methodology traditionally employed to measure endowment. Over two experiments, we report a novel within-subjects method for measuring an endowment bias. In these studies, Western participants showed enhanced valuation of owned items, whereas East-Asian participants did not. This endowment bias also correlated with the ownership effect in memory (a measure of self-referential processing) in Western, but not East-Asian participants. Our results suggest that the endowment effect is partly predicated on the same factors that influence the ownership effect and that this commonality is likely linked to conceptions of ownership specifically, and self-concept more generally.

"If a man owns a little property, that property is him, it's part of him, and it's like him. If he owns property only so he can walk on it and handle it and be sad when it isn't doing well, and feel fine when the rain falls on it, that property is him, and some way he's bigger because he owns it."

George Steinbeck: The Grapes of Wrath (1939)

1.1 The Endowment Effect and Loss Aversion

An important, and robust finding from the field of economic psychology over the past 30 years is that in general, people will demand more money to relinquish their possessions than they would be willing to pay to acquire similar items. In these experiments participants are tested in groups. Those in a selling group are each presented with a low-value object (for example, a coffee mug, or bar of chocolate) and told that it is theirs to keep (e.g., Maddux et al., 2010). They are then asked to determine a price at which they would be prepared to sell this item (*the selling price*). Another group is shown the same object and asked how much they might pay to acquire the item (*the buying price*). The selling price tends to exceed the buying price and this is referred to as the endowment effect (Kahneman, Knetsch & Thaler, 1991; Knetsch, 1989; Maddux et al., 2010). One explanation for this increase in selling price is provided by *Prospect Theory* (Kahneman & Tversky, 1979), where it is suggested that the pain associated with the loss of an item (through selling) exceeds the pleasure associated with its acquisition (through buying) and this desire to mitigate the pain of loss is reflected in the increase in financial compensation demanded by the seller (Birnbaum & Stegner, 1979; Carmon & Ariely, 2000; Kahneman et al.,1991; Rozin & Royzman, 2001; Zhang & Fishbach, 2005). That is ''*the main effect of endowment is not to enhance the appeal of the good one owns, only the pain of giving it up*" (Kahneman et al., 1991, p. 197).

1.2 A Self-Referential Account for Endowment Effects

An alternative account posits that the endowment effect is predicated upon self-referential encoding biases that are associated with ownership of an item (Beggan, 1992). For example, increased valuation may simply be associated with participants (real or perceived) choice to select an item (Brehm, 1956; Johansson, Hall, Sikström, & Olsson, 2005) irrespective of selling it. Other studies demonstrate that simply pairing an item with the self is sufficient to enhance its perceived value (Beggan, 1992; Beggan & Scott, 1997; Jones, Pelham, Carvallo, & Mirenberg, 2004). In this account, owned objects are seen as extensions of self and are therefore imbued with self-enhancing properties. There is an inherent desire to promote a positive self image and therefore the association with self, through ownership, increases the perceived monetary value of an item relative to a similar object not owned and for which no self-associations is present (Gawronski, Bodenhausen, & Becker, 2007).

In traditional endowment tasks where owners are asked to sell their items it is however, difficult to decouple owning and selling, and by extension, to determine which has the greater influence on the price demanded. Nonetheless, in two elegant studies Morewedge, Shu, Gilbert, and Wilson (2009) demonstrated that the price buyers are willing to pay increases when they own a similar item themselves, and that the price sellers are willing to sell for decreases when they do not own the item (i.e., brokers). That is, the association between self and item through current ownership further increases the endowment effect (see also Morewedge & Giblin, 2015 for a review).

1.3 Moderators of the Endowment Effects

Much of the endowment literature is predicated on testing participants in Western countries typically characterised by independent self-construals biased towards self-enhancement (see Baumeister, 1998, for a review). Conversely, people from East Asian countries are purported to hold more interdependent self-construals and be less self-focused (e.g., Heine & Hamamura, 2007; Kitayama, Markus, Matsumoto, & Norasakkunkit, 1997; Markus & Kitayama, 1991). Maddux et al. (2010) demonstrated a significantly larger endowment effect in European Canadian than Asian Canadian participants (Study 1A and 1B). The link between culturally mediated differences in self-construal and the endowment effect was then explored using a priming task. One group of Chinese participants in the interdependent self-construal condition wrote an essay about their friendships and camaraderie with other people and how they might foster these relationships (interdependent self-construal prime). Another group wrote a more self-focused essay (independent self-construal prime), while a third group received no priming at all. The results showed that the largest endowment effect was observed for the independent self-construal condition and there was a smaller, nonsignificant effect observed in the interdependent prime condition. In a final experiment, participants were asked to reflect on the importance and personal salience of the item to self or to reflect on the unimportance of the object (Study 3). Japanese participants showed a significantly larger endowment effect when self-object associations were absent, whereas Canadian participants showed an increase in the endowment when self-item associations were promoted. The authors point to cultural differences in self-enhancement and self-criticism as the driving force behind this

pattern of effects. Cultural differences in self-construal may therefore provide a mechanism to further explore the link between self-referential processing and endowment effects.

Recent evidence of other culturally mediated self-processing biases associated with a more interdependent self-construal have also emerged. In traditional self-referential processing tasks in which trait adjectives are judged on the basis of being descriptive of self or another person, Chinese participants show equivocal memorial performance when items are encoded in relation to self or a close other (i.e., mother). For Western participants, while the biases are smaller than those observed for a self or distant other comparison, biases nonetheless remain (see Symons & Johnson, 1997 for a review). Further evidence of equivocal processing of these two concepts is evidenced by studies that require participants to rate trait adjectives on relevance to self and close-other. There is significant overlap in cortical responses observed in medial prefrontal cortex in Asian participants (Zhu et al., 2007), whereas for Western participants responses in medial prefrontal regions distinguish self from best friend (Heatherton, Wyland, Macrae, Demos, Denny, & Kelley, 2006).

1.4 Exploring the Relationship Between Self and Endowment

If endowment effects are associated to self-related aspects of item ownership, then we should see a relationship with other cognitive biases concomitant with the formation of self-item associations. Cunningham and colleagues have shown that items temporarily owned by self are better remembered than similar items owned by others. This appears to be the case both in adults (Cunningham et al., 2008) and young

children (Cunningham et al., 2014). Looking beyond memorial biases, ownership effects in memory have also been linked to enhanced attentional processing of owned items (Turk, van Bussel, Brebner et al., 2011; van den Bos et al., 2010) and by increased activation of reward circuitry associated with item ownership (Krigolson et al., 2013; Turk, van Bussel, Waiter, et al., 2011). As with endowment effects (Brehm, 1956; Johansson, Hall Sikstrom & Olsson, 2005), memorial advantages can be enhanced by strengthening the self-item association through both real and perceived choice (Cunningham et al., 2011). Truong et al. (2013) further emphasise the importance of self-item association over mere ownership across two experiments. In the first experiment, items were assigned to three categories: owned by self, forbidden to self, and owned by other. Here, items owned by self and forbidden to self (i.e., both encoded in relation to self) were better remembered than items owned by another other person. This memory advantage for forbidden objects disappears when an item is forbidden to everyone (i.e., removing the specific self disassociation).

Cultural variations in self-referential processing biases similar to those seen in the endowment literature have been reported in relation to ownership and memory (Sparks, Cunningham, & Kritikos, 2016). Taking two broad cultural categories (Asian and Western participant), Sparks et al. (2016) demonstrated the expected memorial advantage in Western participants (self-owned better remembered than other owned), and as an absence of memorial advantage in Asian participants (Experiment 1). Furthermore, in a subsequent experiment where participant interaction with the owned-objects was increased (Experiment 2), the researchers showed a reversal of the effect (other better remembered than self) in the Asian population, but only when the *other* was close to the participant (e.g., mother, as opposed to a stranger). Relating

these two patterns to the different levels of involvement and attention required of the participants in their two experiments, the authors interpret this interaction between object-interaction and relational distance as consistent with the Asian populations assumed interdependent self-construal. When cross-cultural studies of ownership and endowment are viewed together, a consistent pattern emerges: that of self-construal impacting upon both of these self-promoting biases. The purpose of the current investigation was to further explore the relationship between culture, self-processing biases in ownership and memory, and endowment effects.

An initial obstacle to this aim manifests from an inherent difference in the way the self-referential encoding effects from temporary ownership and the endowment effect are measured. Ownership effects in memory typically employ a within-participants design, meaning that a bias or difference score can be calculated for each participant (e.g., self minus other or self divided by other; Cunningham et al., 2008), whereas endowment tasks typically apply between-group comparisons (e.g., Maddux et al., 2010) making it impossible to relate endowment effects to ownership effects in memory across participants. As such, the current inquiry first sought to develop a method to measure within-participants differences in prices demanded to sell and buy items (i.e., their *Endowment Bias;* Experiment 1). We then sought to replicate these findings and extend it to different cultural groups. By calculating an endowment bias and an ownership bias in memory we would then be able to explore the relationship between these constructs. If Morewedge et al. (2009) are correct, and endowment effects are predicated on self-processing biases then we predict a greater endowment effect for Western than Eastern participants and a concomitant difference in ownership effects for these two groups. In addition, for Western participants

endowment biases should positively correlate with ownership biases in memory, whereas for Eastern participants we expect to observe no significant relationship between these factors (Experiment 2).

2.1 Experiment 1 –A Within-Subjects Endowment Task

Endowment effects are traditionally measured using between-subjects methods, however some studies using a repeated measures design employing a single item have been carried out (Jefferson & Taplin, 2011; Kogut & Kogut, 2011). Given that owning an item can influence the selling price of a similar item (Morewedge et al., 2009), and the possibility that the provision of one price may serve as an anchor for a second valuation of the same item, and thus moderate the observed endowment effect, we designed a novel multi-item repeated measures endowment protocol. We first tested this method on Western participants as in this group traditional endowment effects are maximal.

2.2 Method

2.2.1 Participants & Design

Thirty-two undergraduate students (28 females) aged between 19 and 21 years of age (mean age = 19.31 years; standard deviation = .93) participated in the study. All had normal or corrected-to-normal visual acuity. The research was conducted in accordance with the guidelines and approval of the University of Bristol Science

Faculty Ethics Committee. The experiment had a two-factor (Endowment: selling price or buying price) repeated-measures design.

2.2.2 Materials

Eight common items were purchased from a local department store. These objects were pretested with a sample of participants who were asked to 'give a value' for each item outside of any context of ownership (N=30). From this, two sets were created that had equivalent perceived value (Set A: spatula, wineglass, plate, fork; average value; Set B: whisk, glass tumbler, spoon, side plate. The average item value in each set was £2.58). No significant difference in value across these two sets was found [$t(29) = .140$, $p=.89$]). The experiment was run on an Apple Macintosh iMac computer using Psyscope X (B57) software (Bonatti, n.d.).

2.2.3 Endowment Procedure

At the start of the experiment, both sets of items were displayed on a table and participants were told that they owned one particular set and that the experimenter owned the other. Ownership of each set was counterbalanced across participants. The experimenter left the room and participants were given a minute to interact with all of the items. Following this the experimenter asked the participant to value each item in a randomized order. For items belonging to the participant, the experimenter would ask, '*how much would you be willing to sell this item for*?*'* and for items that were owned by the experimenter, participants would be asked '*what price would you be willing to buy this item for?*'

2.2.4 Results & Discussion

Consistent with investigations of the endowment effect, the selling price was higher than the buying price. The mean total selling price for the four self-owned items was £10.65 (SE: £1.11), and the mean total buying price for the four experimenter owned items was £9.25 (SE: £1.10). A paired-sample t-test revealed that the selling price was significantly higher than the buying price [$t(31) = 2.46$, $p<.02$, Cohen's $d=.44$], reflecting a small to medium effect.

That we were able to generate an endowment effect using this novel within-subjects protocol offers an important methodological advance in this area. The higher selling than buying price observed in the current study is in line with between-group findings of the endowment effect previously reported (e.g., Kahneman et al., 1991; Knetsch, 1989) and provides a mechanism to calculate each individual participant's *endowment bias* score. This also provides a process by which we can specifically explore the factors that might underpin the endowment effect. Morewedge and colleagues (Morewedge et al., 2009; Morewegde & Giblin, 2015) have argued that the effect is predicated on self-processing biases rather than the previously favoured loss aversion account (Kahneman et al., 1991; Rozin & Royzman, 2001). If Morewedge and colleagues are correct then it should be possible to observe a relationship between measures of self-referential processing biases in memory and the endowment bias in UK participants.

In addition, this relationship may also be subject to cultural variation in self-construal. While independent Western cultural norms might be associated with positively valenced self-construals leading to increased endowment effects and self-referential processing biases, negatively valenced, interdependent self-construals associated with Asian cultural norms (Maddux et al., 2010; Markus & Kitayama, 1991), are characterised by an attenuated endowment effect and a reduced ownership bias in memory (Sparks et al., 2016). This attenuation of the endowment effect in Asian participants is discussed on the basis of a reduced emphasis on positive self-enhancement in interdependent cultures leading to reduced valuation of owned-objects (Norasakkunkit & Kalick, 2002).

The within-participants methodology for measuring endowment biases developed in the current investigation provides a means to investigate the direct association between endowment biases and self-referential processing effects which has hitherto not been possible. It also provides a vehicle to explore the influence that cultural differences in self-construal might have upon this relationship. Following this rationale, a second experiment was set up in order to replicate the ownership bias generated in Experiment 1, and to explore the relationship between endowment, ownership and culture-related self-construal. We expected that UK participants would show an endowment bias using this novel multi-item paradigm and further that there would be a relationship between endowment bias and the memorial advantages observed in the ownership task for this group. Such evidence would provide further support for the theory that endowment effects are predicated on self-processing biases rather than a loss aversion account (see Morewedge et al., 2009; Morewedge & Giblin, 2015). However, Japanese participants should show and attenuated

endowment bias and ownership effect in memory in line with their purported interdependent self-construal.

3 Experiment 2: Endowment, Ownership and Culture

3.1 Method

3.1.2 Participants & Design

Two groups of participants were recruited: one group from the UK and another from Japan. Sixty-one undergraduate students (20 males) aged between 18 years 6 months and 26 years 0 months (mean age 21 years 0 months) were recruited from the University of Bristol. Fifty-two undergraduate students (32 males) aged between 18 years 0 months and 25 years 11 months (mean age 20 years 5 month) were recruited from Asia University, Japan. All participants had normal or corrected-to-normal visual acuity. The research was conducted in accordance ethical guidelines at the Asia University, Japan and the University of Bristol.

3.1.3 Materials

Experiment 2 involved an endowment task, and an ownership and memory task. During the endowment task, the UK participants used the same four items that were used in Experiment 1A (flatware, glassware, kitchen utensils and cutlery). For the Japanese participants, the spatula was replaced with a ladle as the former item was not available locally. The monetary cost of the set of objects used in Japan was

approximately 1000 yen (or approximately £5.50 at the time the experiment was conducted).

For the ownership and memory task, three sets of familiar common objects sold in major retail outlets in each country were selected as stimuli in this experiment. These consisted of tableware, food, drinks, clothing and other general household items. For each cultural group, sets were matched across item categories (e.g., fruits: Set A: apple; Set B: orange; Set C: lime). Each image was placed onto a 250 by 250 pixel white canvas at and on-screen resolution of 72 pixels per inch with a 25-pixel black border all around the object giving a total visual array size was 300 by 300 pixels. At a viewing distance of 57cms this presented an array that was 10.5 degrees of visual angle in both the horizontal and vertical plane. In addition we used two images of shopping baskets (on a canvas of 250 by 250 pixels). These images were red or blue on a white background. Ownership of each object was denoted by a change in the border colour to either red or blue accordingly. Two sets of items were used in the encoding phase and one set of items was retained as foils for the memory test phase.

3.1.4 Procedure

All participants were tested in their native language. In addition, Japanese participants were tested by a Japanese researcher and UK participants were tested by a native researcher from the UK. For the endowment task, the procedure was identical what is described above in Experiment 1. The ownership task involved an encoding phase and a test phase. During the encoding phase, participants were tested individually. They were told that they and the experimenter had won a competition in

which they would each receive a basket full of shopping items. They were then given instructions for the encoding phase (see Figure 1 for a schematic representation of the tasks). A blank screen was presented with a shopping basket in each of the two top corners. Participants were informed that one basket was theirs (i.e., "self-owned"), and they were asked to imagine that everything that went into that basket belonged to them. The other basket, along with its contents, was designated as belonging to the experimenter (i.e., "other-owned").

For each trial, an initial 1500ms fixation period in which a cross-hair was presented in the centre of the screen was followed by a 1000ms presentation of an item usually found in any major supermarket. This item was initially presented inside a black border. Following this the border colour changed to either red or blue to signify who owned the item and the participant placed the item into the correct shopping basket by pressing a button corresponding to basket colour (see Figure 1).

After the encoding phase participants undertook a surprise source memory test. In this test phase, they were presented with all of the items viewed during the encoding phase and an additional 50 unseen items. Trials began with a 1500ms fixation period after which the test item was presented in the centre of the computer screen surrounded by a black border. This item remained until a response was made. Participants were instructed to decide for each object whether it was owned by self, owned by the experimenter or was a new item. Responses were made using a button box. Participants were asked to respond as quickly and as accurately as possible. Following the completion of the test participants were thanked, debriefed, and dismissed.

3.1.5 Results

3.1.5.1 Endowment Effects

Given the different currencies used to generate selling and buying prices we analysed the endowment data separately for each group. For Japanese participants, the average selling price for all items was ¥719.25 (SE: ¥51.55) and the average buying price was ¥694.48 (SE: ¥50.71). A two-tailed, paired-sample t-test revealed no significant difference between these prices [$t(51)=0.54$, $p=59$], indicating that Japanese participants did not demonstrate an endowment effect. For UK participants, the selling price was £6.59 (SE: £1.35) and the buying price was £5.02 (SE: £0.81). A two-tailed, paired-sample t-test revealed a significant difference between these prices [$t(60)=2.55$, $p<.02$, Cohen's $d = .33$ representing a small effect]. This demonstrates a replication of the endowment effect observed in Experiment 1 for UK participants.

3.1.5.2 Ownership Effects

The recognition memory data (e.g., hit-rate & false-alarm-rate) critical for calculating ownership-related self-memory biases were calculated for each ownership condition and converted into measures of accuracy (d-prime – *d'*) according to signal detection algorithms (Green & Swets, 1966; Stanislaw & Todorova, 1999). We also calculated median response latency for correct responses during encoding and test phases (see Table 1).

Data from the encoding phase were subjected to a mixed ANOVA with the repeated factor of owner (self or other) and the between-subjects factor of group (UK or Japan) explored differences at encoding. For response accuracy there was a significant main effect of group, with Japanese (Mean: 0.996, SD: 0.008) participants significantly more accurate in the encoding phase than UK (Mean: 0.98, SD: 0.017) participants [$F(1,111)=32.02$, $p<.001$]. However we observed no significant main effect of owner [$F(1,111)=.03$, $p>.80$], and no interaction between group and owner [$F(1,111)<.001$, $p>.98$].

A similar mixed ANOVA design was applied to the response latency data. Here we observed a significant main effect of group, with Japanese participants (Mean: 489.46ms, SD: 134.41ms) significantly slower to respond than UK (Mean: 372.67ms, SD: 51.78ms) participants [$F(1,111)=39.27$, $p<.001$]. Again, we observed no significant main effect of owner [$F(1,111)=.99$, $p>.3$], and no interaction [$F(1,111)<.001$, $p>.99$].

This analysis demonstrates that although Japanese participants took longer, perhaps as a result of more dedication to accuracy during the encoding phase of the experiment, there was no interaction with the within-subjects factor of owner in both accuracy and response latency suggesting that any observed ownership differences at test could not be the result of specific encoding biases.

To analyse the data from the test phase, accuracy scores (d') were subjected to a mixed ANOVA with the repeated factor of owner (self or other) and the between-participants factor of group (UK or Japan) to explore any differences at test. There

was a significant main effect of group, with UK participants significantly more accurate than Japanese participants [$F(1,111)=7.14$, $p<.01$]. We also observed a significant main effect of owner [$F(1,111)=13.25$, $p<.001$], with self-owned items better remembered than those owned by the experimenter and a significant owner-by-group interaction [$F(1,111)=5.97$, $p<.02$]. Post-hoc pairwise comparisons showed that for UK participants there was greater accuracy for self-owned (Mean: 1.04, SD: 0.63) compared to other-owned (Mean: 0.76, SD: 0.55) items [$t(60)=4.44$, $p<.001$]. However, for Japanese participants there was no difference in accuracy for self (Mean: 0.57, SD: 0.83) or other owned (Mean: 0.51, SD: 0.95) items [$t(51)=.83$,$p=.41$].

For response latency there was no significant effect of group [$F(1,111)=3.02$, $p=.085$], no effect of owner [$F(1,111)=.815$, $p=.369$], and no interaction [$F(1,111)=2.47$, $p=.119$].

Finally, to explore the relationship between endowment and ownership bias, we calculated bias scores from each participant for both endowment data and ownership and memory data. For *Endowment Bias* this was calculated by dividing the selling price by the buying price. For the *Memory Bias* measure, this was calculated by dividing d-prime Self by d-prime Other. Four of the Japanese participants had Self or Other d-prime scores of zero and therefore the memory bias transformation was not possible, so this analysis was carried out on 61 UK participants and the remaining 48 Japanese participants. For the UK participants there was a significant correlation between endowment bias and memory bias [$r(61)=.349$, $p=.006$], but for Japanese

participants there was no significant relationship between these factors [$r(48)=-.206$, $p=.16$] (See Figure 2).

3.1.6 Discussion

For Japanese participants we observed no significant endowment effect using our within-subjects method. Previous studies using the traditional between-participants task have demonstrated significant, but attenuated endowment effects in Asian participants (Maddux et al., 2010). However, when Japanese participants were asked to reflect on the importance of the owned item the endowment effect was no longer present. In the current study we encouraged participants to interact with each item thus raising the self-item association and this may have served to reduce the endowment effect. This group variability in the endowment bias is consistent with the notion that it is the extension of self to possessions that mediates this effect (Morewedge et al., 2009; see also Morewedge & Giblin, 2015 for an overview). That is for UK participants, valuations are higher for self-owned items as a result of the need to maintain a positive self-image, whereas for Japanese participants less importance is places on self and this is echoed in a reduced valuation of personal items observed (see also Maddux et al., 2010).

In addition to the group interaction in the endowment effect, we also observed differences in ownership biases in memory. UK participants produced an ownership effect in memory typical of participants in western samples, with items temporarily owned by self being better remembered than those associated with another referent (Cunningham et al., 2008; Turk et al., 2011). However, Japanese participants showed

no ownership effect and decreased memory sensitivity compared with UK participants. These findings are consistent with previous research on ownership effects in East Asian subjects and have been attributed to differences in attentional allocation at encoding (Sparks et al., 2016), previously shown to be critically important in ownership effects in memory (Turk, van Bussel, Brebner et al., 2011; Turk et al., 2013).

For UK participants, we also observed a significant correlation between endowment bias and ownership effects in memory, whereas no significant relationship existed between these variables in the Japanese group. This suggests that as self-positivity biases increase additional cognitive resource may be allocated to self-relevant objects, thus enhancing subsequent recognition of those items.

4 General Discussion

For more than thirty years, the endowment effect has been reliably observed across studies involving children (Harbaugh, Krause, & Vesterlund, 2001), adults (see Morewedge & Giblin, 2015 for a review) and has also been demonstrated in primates (Lakshiminaryanan, et al., 2008). Early studies had suggested that loss aversion was the basis for the difference between buying and selling price (e.g., Tversky & Kahneman, 1991), but more recent research places greater emphasis on the role of self in driving this effect (Beggan, 1992; Gawronski, Bodenhausen, & Becker, 2007; Maddux et al., 2010; Morewedge et al., 2009; Morewedge & Giblin, 2015). For example, Maddux et al. (2010) found that the endowment effect was maximal for independent, Western cultures where self is construed with a positivity bias, and

attenuated in interdependent, Eastern cultures associated with more negative self-construals (see also Heine et al., 1999). Gobel, Ong, and Harris (2014) also report the importance of social context on endowment effects. Under public encoding scenarios (i.e., valuing an owned item used in a work environment), East Asian participants showed no endowment effects, whereas, imagining the use of personal possessions in a private context led to significant differences between selling and buying process often observed in Western participants. The authors suggest that employing a public encoding context should serve to decrease the selling price of personal possessions, whereas it may increase the value of property owned by a significant other (e.g., mother; see also Feng, Zhao, & Donnay, 2013). Thus social context may be an important factor in interpreting the relationship between ownership, endowment and culture in future studies of this nature.

The relationship between culture, ownership and endowment has been difficult to establish due to the between -subjects methodology previously employed in measuring endowment effects. The current experiment provides an avenue to further explore this relationship with the development of a multiple-item within-subjects methodology to measure an *endowment bias*. In two studies involving UK participants, we observed a significant endowment bias in line with the extant literature, whereby selling prices were significantly higher than buying prices for similar items for UK participants. Moreover, for Western participants this endowment bias was also positively correlated with the ownership bias in memory (Experiment 2). Japanese participants, however, did not exhibit either an ownership effects in memory or an endowment bias. We also observed no relationship between these constructs in this East Asian sample. Further experiments should seek to replicate

these cross-cultural effects and to explore the relationship between ownership, endowment and social context using this within-participants methodology.

The experiments presented here highlight not only the likelihood that the gaps between buying and selling prices are larger for people of Western origin, but that there is also considerable variation within that population. Further, it provides a route to begin to explore the idea that the enhanced value for ones' own objects might have underlying relations to other important cognitive biases. For example, Morewedge and Giblin (2015) have suggested that one possible mechanism that links the self-reference effect in memory (see Symons & Johnson, 1997) and the endowment effect is that ownership enhances the accessibility of (*mostly positive*) aspects of ones' own possessions. Thus, in a selling transaction these (*mostly positive*) attributes are made more prominent than other aspects. The within-participants design presented here broadens the scope for investigating such relationships further. These new directions of inquiry might shed further light on the situational criteria that need to be satisfied to observe the endowment effect. If it is predicated on a seller's ability to access attributes of an owned item, situations that reduce such access should attenuate the endowment effect, in much the same way as the self-reference effect in memory is reduced when attentional resources are taxed (see Turk, Brady-van den Bos, Collard, Gillespie-Smith, Conway, & Cunningham, 2013). In the current investigation we employed a single price mechanism to measure the endowment bias. It was suggested by an anonymous reviewer that we consider how cultural differences in haggling behaviour might have impacted on our results. In Japan, it is not customary to haggle in one-on-one buyer-seller interactions, in fact, it is generally seen as socially unacceptable. However, future experiments using our within-subjects paradigm could

examine the impact of haggling on endowment biases and ownership effects in populations where haggling represents the cultural normal for selling and buying items, for example in South East Asia. In addition, the reviewer questioned whether we might expect higher ownership and endowment effects to be associated with higher levels of self-esteem. Given the underlying literature that self-positivity biases are associated with endowment effects and with enhanced self-referential encoding effects in memory, this seems likely. However, we also note that personal possessions could be more important to those who might have lower levels of self-esteem. Research by Kogut and Kogut (2011) explored the impact of attachment style on owner-object relationships. They demonstrated that insecurely attached, preoccupied, individuals high in anxiety were less willing to part with transiently owned objects than dismissive individuals, high in avoidance. It has been suggested that this reflects preoccupied individuals' hyperactivation of the attachment system, whereby when they do not have a secure base from human interaction, therefore their sense of security may be derived from non-human entities, such as objects (Kogut and Kogut, 2011). In addition, it has been shown that insecurely attached adolescents for example are also more likely to have low self-esteem (Gamble & Roberts, 2005). We concur therefore that an examination of the relationship between self-esteem, self-reference and endowment is certainly worthy of future exploration.

While the previous literature on endowment effects involving Western and Eastern participants is discussed in the context of cultural differences in self-construal, it is important to note that we have not specifically measured culture in the current study. We have however tested participants from the UK and Japan and observed significant group differences in the relationship between endowment effects and self-referential

encoding effects in memory between these groups. If these effects are culturally mediated then one might expect some relationship between the strength of cultural identity, the endowment bias, and self-referential encoding. For example, would Japanese students attending a North American University and thus exposed to Western cultural norms show a different pattern of endowment and self-referential memory biases to those remaining in Japan, and would the length of time spent in the West predict an enhancement of the endowment bias for these individuals? These questions should be the focus of future research in this area. The studies reported here provide further support the proposed self-processing account for the endowment effect (see Morewedge et al., 2009; Morewedge & Giblin, 2015). Future studies will be able to utilise our novel paradigm to further chart the relationship between endowment, culture and self.

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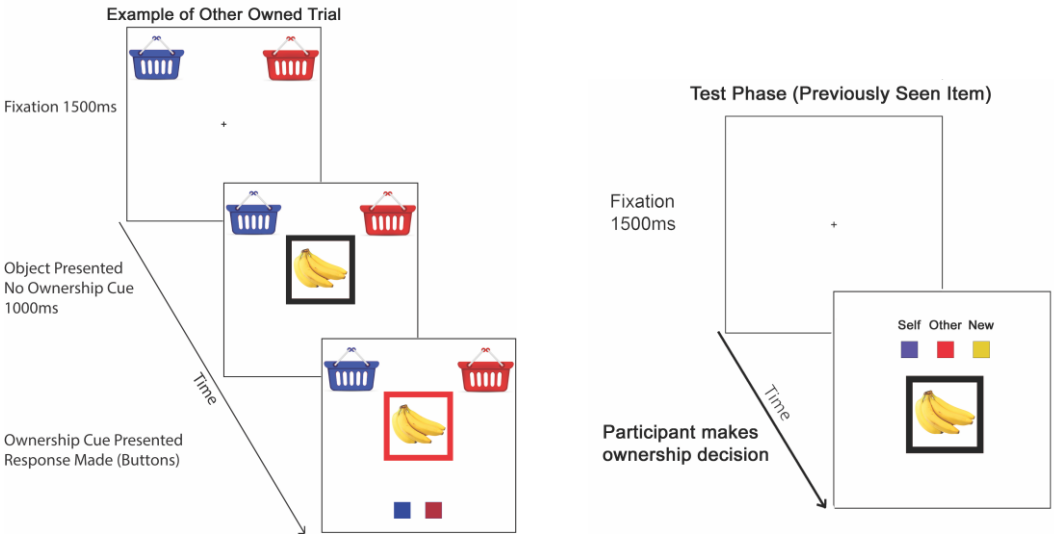

Figure 1: Examples of Encoding (Left) and Test (right) trials.

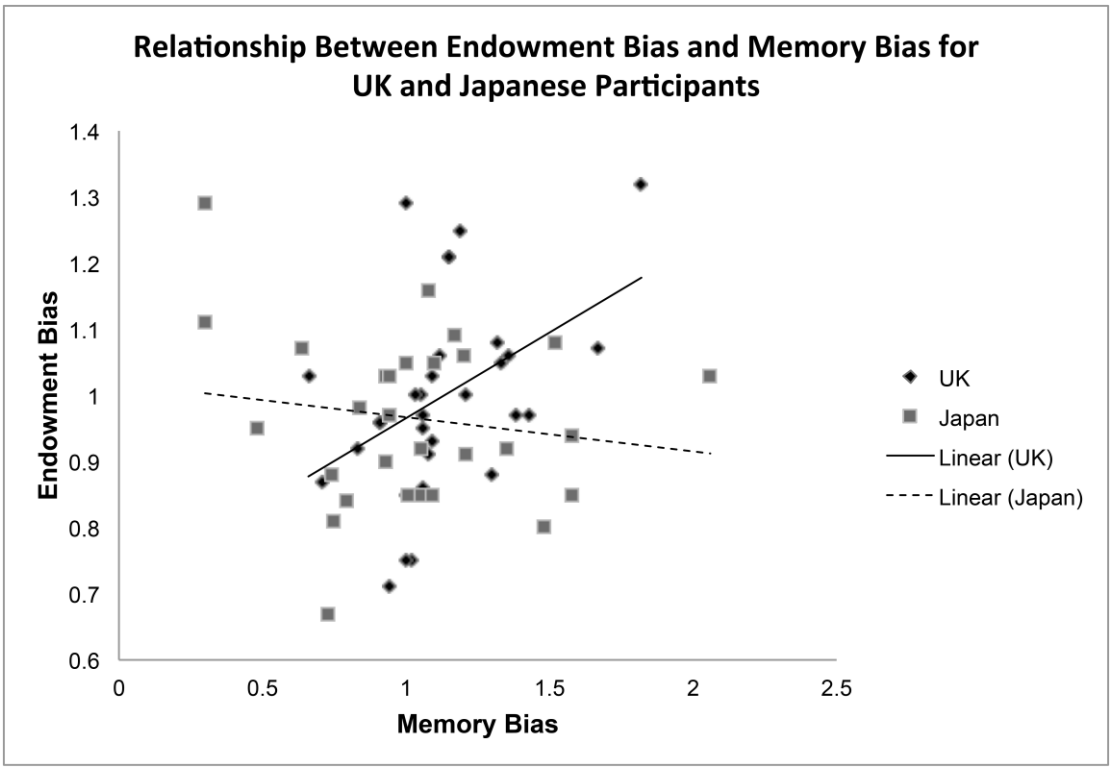

Figure 2: Correlation between endowment bias and memory bias for UK (diamonds) and Japanese (squares). Significant correlation for UK participants only.

Table 1: Table of Means. Figure in parentheses represents one standard deviation of the mean.

Measure	UK Self	UK Other	Japan Self	Japan Other
Encoding Accuracy (%)	98.16 (.02)	98.13 (.02)	99.62 (.01)	99.58 (.01)
Encoding RT	371.25 (54.75)	374.09 (53.27)	487.99 (135.25)	490.93 (135.31)
Test Accuracy (d')	1.04 (.63)	.76 (.54)	.50 (.73)	.45 (.68)
Test RT	1315.03 (397.49)	1408.04	1538.51	1513.4

Supplementary Materials

Set A Endowment Items (UK participants)

Set B Endowment Items (UK participants)